# 4.11 PALEONTOLOGICAL RESOURCES

This section incorporates information from the Geotechnical Reconnaissance Report prepared by GEOCON (2010a) and an unpublished County of San Diego Paleontological Resources Report by Deméré and Walsh (1993). The Geotechnical Reconnaissance Report is provided in Appendix C of this EIR.

## 4.11.1 Environmental Setting

Paleontological resources are the remains and/or traces of prehistoric plant and animal life. The formation of fossils typically involves the rapid burial of plant or animal remains and the formation of casts, molds, or impressions in the associated sediment (which subsequently becomes sedimentary rock). Because of this, the potential for fossil remains in a given geologic formation can be predicted based on known fossil occurrences from similar (or correlated) geologic formations in other locations.

The geology of the project site is characterized by compacted fill soils underlain by either alluvium or the Santiago Formation. The Middle Eocene-age Santiago Formation (approximately 40 to 49 million years old) was mapped along the southern edge of the property (and likely underlies the entire SP area). The Holocene-age alluvial soils (approximately 12,000 years old or younger) underlie the fill materials across the remainder of the SP area. Additional description of site geology is provided in Section 4.5, *Geology and Soils*, of this EIR; refer to Figure 3 of Appendix C for the location of surficial and geologic units.

Each of the geologic units within the SP area has been evaluated for paleontological resource potential and assigned a sensitivity rating, based on the following criteria derived from sources including Deméré and Walsh (1993). The sensitivity levels described herein are the same as the resource potential ratings.

- High Sensitivity – High resource potential and high sensitivity are assigned to geologic formations known to contain paleontological localities with rare, well preserved, critical fossil materials for stratigraphic or paleoenvironmental interpretation, and fossils providing important information about the paleoclimatic, paleobiological and/or evolutionary history (phylogeny) of animal and plant groups. In general, formations with high resource potential are considered to have the highest potential to produce unique invertebrate fossil assemblages or unique vertebrate fossil remains and are, therefore, highly sensitive.

- Moderate Sensitivity – Moderate resource potential and moderate sensitivity are assigned to geologic formations known to contain paleontological localities. These geologic formations are judged to have a strong, but often unproven, potential for producing unique fossil remains.

- Low Sensitivity – Low resource potential and low sensitivity are assigned to geologic formations that, based on their relatively young age and/or high-energy depositional history, are judged unlikely to produce unique fossil remains. Low resource potential formations rarely produce fossil remains of scientific significance and are considered to have low sensitivity. When fossils are found in these formations, however, they often provide significant additions to the geologic understanding of the area.

- Marginal/Unknown Sensitivity – Marginal/unknown resource potential and marginal/ unknown sensitivity are assigned to geologic formations that are composed either of volcaniclastic (redeposited materials derived from volcanic sources) or metasedimentary rocks, but that nevertheless have a limited probability for producing fossils from certain formations at localized outcrops. Volcaniclastic rock can contain organisms that were fossilized by being covered with ash, dust, mud, or other debris from volcanoes. Sedimentary rocks that have been metamorphosed by heat and/or pressure caused by volcanoes or plutons are called metasedimentary. If the sedimentary rocks had associated paleontological resources, those resources may have survived the metamorphism and still be identifiable within the metasedimentary rock. Because the probability for such occurrences is limited, however, these formations are considered marginally sensitive.

- No Sensitivity – No resource potential is assigned to geologic formations that are composed entirely of volcanic or plutonic igneous rock, such as basalt or granite. Specifically, these rocks exhibit a molten origin and therefore do not have any potential for producing fossil remains. Accordingly, these formations have no paleontological resource potential or sensitivity.

Human-derived deposits, such as compacted fill soils, would be considered to have no sensitivity, due to their recent age and lack of potential to contain fossil resources. Alluvium generally consists of poorly consolidated clays, silts, sands, and gravels of relatively recent age (i.e., generally younger than 12,000 years old). In general, these deposits were laid down by ephemeral streams and estuaries that occupy the drainages and low-lying coastal areas today, which would include Buena Vista Creek and Lagoon in the case of the SP area and vicinity.

Based on the above criteria and the fact that fossils are generally unknown from the later Quaternary alluvial deposits, alluvium has a low sensitivity rating (Deméré and Walsh 1993).

The Santiago Formation generally consists of relatively flat-laying claystone, siltstone, and sandstone units. This formation has produced abundant vertebrate fossils, including remains of turtles, snakes, lizards, crocodiles, birds, and mammals. The mammalian assemblages are especially significant because of their great faunal diversity and excellent specimen preservations. Thus, the Santiago Formation exhibits a high sensitivity rating (Deméré and Walsh 1993).

### 4.11.2 Thresholds for Determining Significance

Appendix G of the State CEQA Guidelines is used to provide direction for determination of a significant paleontological resource impact from the proposed project. For the purposes of this EIR, a significant impact would occur if the proposed project would:

- Allow grading or construction in areas underlain by geologic formations that exhibit a moderate to high paleontological resource potential; or

- Directly or indirectly destroy a known unique paleontological resource or site, or unique geologic feature.

### 4.11.3 Environmental Impact

Paleontological resources are typically impacted when earthwork activities such as mass excavation projects cut into geological formations within which fossils are buried. These impacts are in the form of physical destruction of fossil remains. Since fossils are the remains of prehistoric animal and plant life, they are considered nonrenewable. Such impacts are significant, and under State CEQA Guidelines, require mitigation.

There would be no significant impact in portions of the SP area where excavation and grading would occur within artificial fill, as these materials have no potential for paleontological resources. Analysis of the most recent geologic map provided in the Geotechnical Reconnaissance Report (GEOCON 2010a) indicates the surface geology in the SP area is predominantly younger alluvial deposits. These materials have a low potential for paleontological resources; as such, potential impacts from excavation and grading into younger alluvial deposits would be less than significant. However, ground-disturbing activities

associated with the current SDP proposal could extend into previously undisturbed areas of the Santiago Formation, which is assigned a high paleontological resource sensitivity. The maximum depth of excavation associated with the SDP would be 22 feet where the lower level would expand into the southern parking lot. The remainder of the site would be excavated to a depth of no more than two to three feet. Excavation into the Santiago Formation could have a potentially significant impact on paleontological resources.

### 4.11.4 Mitigation Measures

*P-1* A Paleontological Mitigation Plan (PMP) shall be prepared prior to the start of construction of the current SDP proposal and any future SDPs that involve excavation into previously undisturbed areas of the Santiago Formation, as there is potential to encounter highly sensitive paleontological resources within the limits of the SP area. The following elements shall be included in the PMP:

As a condition of the grading permit, the developer shall comply with the following measures:

- Prior to initiation of construction activities, the project developer shall retain a qualified paleontologist to carry out the mitigation program outlined here. A qualified paleontologist is defined as an individual with a M.S. or Ph.D. in paleontology or geology who is familiar with paleontological procedures and techniques.

- A qualified paleontologist shall be at the preconstruction meeting to discuss grading plans and consult with the grading and excavation contractors regarding the potential location and nature of paleontological resources and associated monitoring/recovery operations.

- A paleontological monitor shall be on site at all times during grading/excavation activities involving previously undisturbed deposits of high sensitivity formations (Santiago Formation) to inspect for well-preserved fossils. The paleontological monitor need not be on site during the original cutting of previously undisturbed deposits of zero sensitivity formations (alluvium and compacted fill). A paleontological monitor is defined as an individual who has experience in the collection and salvage of fossil materials. The paleontological monitor shall work under the direction of a qualified paleontologist.

- In the event that well-preserved fossils or other unearthed paleontological resources are discovered, the paleontologist (or paleontological monitor) shall recover them. In most cases this fossil salvage can be completed in a short period of time. However, some fossil specimens (such as a complete large mammal skeleton) may require an extended salvage period. In these instances the paleontologist (or paleontological monitor) shall be allowed to temporarily direct, divert, or halt grading to allow recovery of fossil remains in a timely manner. Because of the potential for the recovering of small fossil remains, such as isolated mammal teeth, it may be necessary to set up a screen-washing operation on the site.

- Fossil remains collected during the monitoring and salvage portion of the mitigation program shall be cleaned, repaired, sorted, and cataloged.

- Prepared fossils, along with copies of all pertinent field notes, photos, and maps shall be deposited (as a donation) in a scientific institution with permanent paleontological collections such as the San Diego Natural History Museum. Donation of the fossils shall be accompanied by financial support for initial specimen storage.

- A final summary report shall be completed and submitted to the Planning Division that outlines the results of the mitigation program. This report shall include discussions of the methods used, stratigraphic sections exposed, fossils collected, and significance of recovered fossils. Compliance with this mitigation measure shall be verified by the City of Carlsbad Land Division's Engineering Division.

### 4.11.5 Level of Significance after Mitigation

Implementation of Mitigation Measure P-1 would reduce the impact associated with paleontological resources to a level less than significant.

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